concentrically laminated; beak acute, incurved, with a small adherent area; larger valve extended laterally, inflated and bilobed, having a wide and deep sulcation which extends from the beak to the lower border; upper valve concave; margins of the valves sinuated.

The deep sulcation in the dorsal surface separates a posterior lateral lobe, which in the mature form has a diameter equal to a third part of the entire valve: in the young state the posterior lobe is but slightly developed, and the valves at that part are thin, but the groove is always conspicuous.

The species which most nearly approach *G. Buckmanni* are *G. dilatata*, Sow., and *G. controversa*, Roemer; but these latter are much larger species, they are less inflated, and have the dorsal sulcation much more superficial.

XIX.—*On two new Subgenera of* Calanidæ.

By John Lubbock, Esq., F.Z.S.

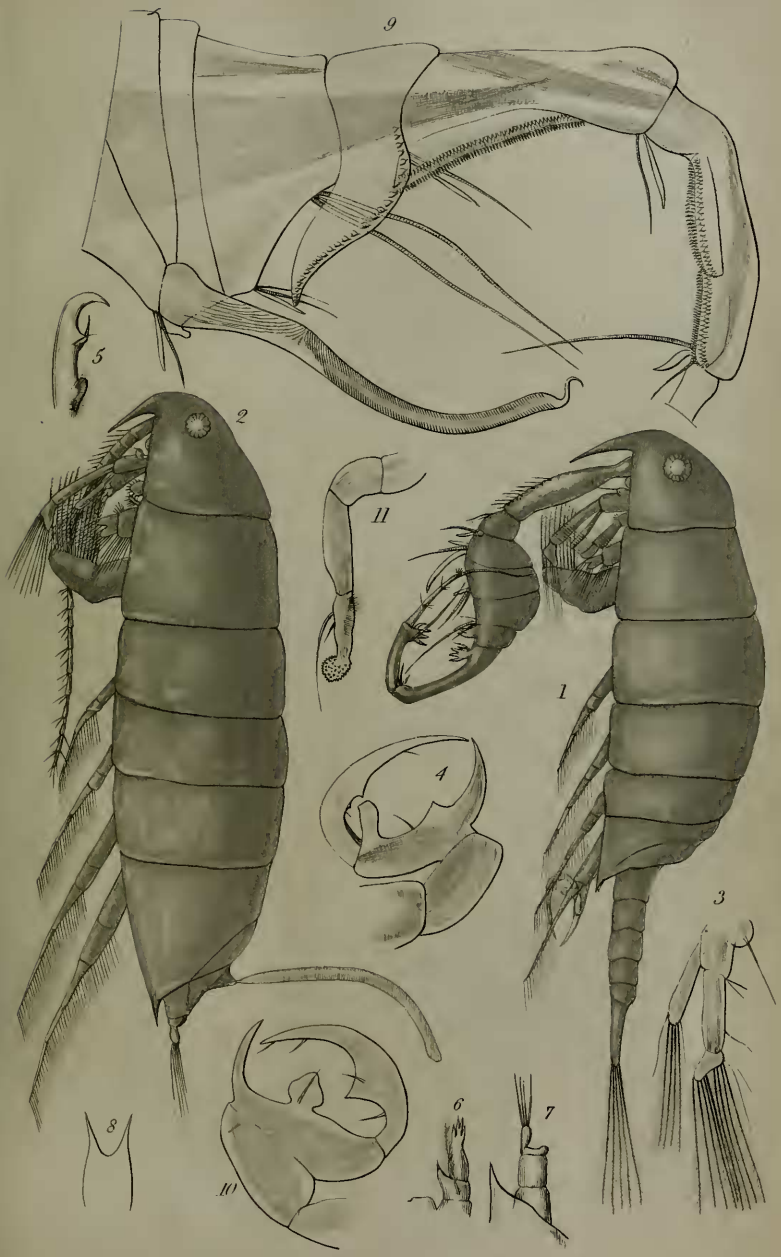
[With a Plate.]

Among Mr. Darwin's Crustacea, I discovered a few specimens of a remarkable Entomostracan nearly allied to *Labidocera Darwinii*, but differing considerably from it in the structure of the right antenna of the male, of the fifth pair of legs, and of the abdomen of the female; and lately, in the collection of the College of Surgeons, through the kindness of Prof. Owen and Prof. Quekett, I found a single male specimen of a third very distinct species belonging to the same group, in which the right antenna of the male is more anomalous than in any form yet described. These two new species will, I believe, eventually form the type of two new genera; for the present, however, it will perhaps be more convenient to consider them subgenera of *Labidocera*. For this purpose it will be necessary slightly to alter its generic character, which will stand as follows:—

Labidocera.

Rostrum furcatum; *antenna antica* maris dextra geniculans tumida, lamellis lobulisve dentatis instructa. *Oculi superiores* duo. *Oculi inferiores* nulli? *Cephalothorax* 7-articulatus. *Pes posticus* maris dexter, prehensilis. *Abdomen* maris 4-articulatum, fœminæ 2-articulatum.

And will contain three subgenera:—



J. Lubbock del.

J. De C. Sowerby sc.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1. Labidocera.

Antenna antica maris dextra duabus serratis lamellis instructa. *Spina prehensilis,* parva, rigido crini similis. *Pes thoracicus quintus sinister,* parvus, ramum internum 2-articulatum, ad apicem annulatum gerens.

Contains one species, *Labidocera Darwinii,* which was described at length in the 'Annals and Magazine of Natural History' for Jan. 1853.

2. Labidocera (Ivella).

Antenna antica maris dextra tribus dentatis lobulis instructa. *Spina prehensilis,* magna. *Pes thoracicus quintus sinister,* magnus, fortis, ad apicem acutus et corneus, ramum internum non gerens.

Also contains one species, *L. Patagoniensis,* which will be described presently.

3. Labidocera (Iva).

Antenna antica maris dextra quatuor dentatis lamellis instructa, tumidissima. *Spina prehensilis,* maxima, annulata. *Pes thoracicus quintus sinister,* magnus, ad apicem tumidus, papillosus.

This subgenus also contains as yet but one species, *L. magna,* which comes from the South Pacific Ocean.

I now proceed to describe *Labidocera* (*Ivella*) *Patagoniensis,* only noticing those points in which it differs from the description of the genus given in the 'Annals and Magazine' for January last.

Pl. X. fig. 1 represents the male, and fig. 2 the female.

First pair of antennæ. These organs will be described in detail, and compared with those of the other members of this group in an appendix.

Right male. Length $\frac{1}{18}$ inch. The basal portion consists of a number of obsolete joints, and is clothed with plumose hair; the next few joints are swollen, the apical one the smallest, and provided with a two- or three-toothed lobe; the next two joints long and slender, each with a toothed lobe, of which the basal is four-toothed, the apical three-toothed; and the three last joints small and simple. Attached to the swollen portion is a prehensile spine like that of *Pontella.*

The second pair of antennæ (fig. 3) is provided at the base anteriorly with a hemispherical lobe which bears one hair. The basal joint was imperfect in the specimen which I represented in my former paper, and the lobe had been torn off.

Inferior eyes. From the fact of spirits of wine removing all the colour of the eyes in this family, it is very difficult to ascer-

tain whether specimens which have been long preserved in spirits, have or have not the inferior eyes, and I have not been able to determine this point with certainty. This species, as well as *L. Darwinii* and *magna*, presents a round projection between the anterior antennæ, similar to that which in *Pontella*, &c., bears the inferior eye; but I have not been able to find any lens belonging to it, and as Mr. Darwin, who, as I before said, must have seen it in recent specimens, had it been present, especially as he examined the mouth, did not notice it, I feel sure that in *L. Darwinii* it is not present; and as the projection is not so well developed in *L. Patagoniensis* or *magna* as in that species, I think myself justified in saying that they also have no inferior eyes.

Mandibles $\frac{1}{66}$ inch in length. They have, like *L. Darwinii*, two large outer teeth, then three small ones, and then a spine serrated externally. Between each of the small teeth is a little lobe; if we count these, we shall have seven teeth and a spine. There are also several rows of strong hairs, which run parallel to the longer axis of the organ on its flat surface; they are all on the inner half.

First pair of maxillipeds $\frac{1}{37}$ inch.

Second pair of maxillipeds—consist of a subquadrate lobe bearing a six-jointed palpus, larger in proportion than that of *L. Darwinii*, and more resembling that of *L. magna*. The hairs on this organ and on the following, are throughout the whole of this family, I believe, for the most part only plumose on the under side. On the palpus there are two unequal hairs at the apex of the two basal segments, one at that of the three following, and three at that of the apical segment. The hairs on the apex of the last two segments have below spines so small, that I could only just see them with a $\frac{1}{8}$-inch object-glass; the others, besides the setæ below, have above very small spines, which are rather larger near the apex, and do not appear to reach more than half-way down the hairs. On the organ itself are five large and two small hairs. The two small ones which are at the apex and the last are setose only above, and the central one also has a few setæ on the upper edge, though neither so large nor so numerous as those below. Length $\frac{1}{80}$ inch; of the palpus $\frac{1}{66}$.

Third pair of maxillipeds. Length $\frac{1}{40}$. The larger hairs on this organ, which appear to have only one row of secondary hairs, have in reality two, one above the other, and both turned in the same direction. The crenature at the tip is caused by a double row of short spines or scales; in the smaller hairs which appear verticillate, these spines are longer, and extend from the apex more than half-way towards the base. Besides these large hairs, there are others smaller. Along the inner margin of the third

hair is a row of finer hairs placed close together, besides the usual spines which are larger and much further apart.

Fifth pair of thoracic legs. Female (fig. 6). Very small, $\frac{1}{32}$ inch. The basal part consists of two joints, the apical produced externally into a lobe which represents the inner branch of the preceding legs, and bearing externally a simple segment, analogous to the external branch, which bears at the apex three spines closely applied to the organ. Attached to the second segment is a large plumose hair which extends to the apex of the terminal segment.

Male (figs. 4 & 5). The left leg is simple, four-jointed, as large as the right, curved towards it, and larger and stronger than the corresponding leg of *L. Darwinii*. The terminal segment bears on its internal margin two lobes; close to the apical lobe is a simple hair and a delicate pointed appendage. At the basal lobe there is a short hair and two very delicate tufts. Length $\frac{1}{27}$ inch. I could find nothing similar to the penis ? of *L. Darwinii*.

The right leg is prehensile, and also consists of four joints. The first is short, the second longer, the third large, muscular, and the external basal angle produced into a large claw; the fourth segment is long, slender, and curved, and forms with the preceding joint a powerful prehensile apparatus. This finger bears on the internal margin two slight protuberances and a small hair, and near where it rises, there is on the third segment a rounded knob. When the prehensile apparatus closes, this knob is received into a corresponding depression at the base of the apical segment, by which contrivance the points of the fixed and of the moveable claw would be forced into opposition, and the strength of the organ greatly increased.

Abdomen. Male. Four-jointed, the terminal joint bearing two lamellæ which rise from a common base, and are terminated by five long setose hairs.

It is exactly like that of *Pontella, Labidocera,* &c.

Female (fig. 7). Small, two-jointed; the two joints are of equal size, and the second bears two small round lobes, each with five setose hairs, which represent the lamellæ in the male.

The abdomen of some females differs slightly from the above description; the joint is not apparent; on the left side is an unsymmetrical projection, of a horny appearance, and the whole base has an irregular outline and a reddish chestnut colour, almost as if a glutinous matter had been poured over it and had hardened there. On this there is a cylindrical appendage, the nature of which is as yet doubtful. It is large, elongated, of nearly equal thickness throughout, but slightly swollen at the apex, and terminated by a short narrow neck, attached to

the middle of the dorsal surface of the first abdominal joint. It is hollow and empty with soft elastic sides, and $\frac{1}{13}$th of an inch long.

In all the specimens I have seen, this organ has formed a right angle with the longer axis of the body, as I have drawn it; but this position would be such an obstacle to rapid motion, that I consider it owing only to spasmodic contraction of the animal when put in spirits of wine. It would probably during life be extended in the axis of the body, as in *Caligidæ*, and would partly supply the place of the abdomen, and act as a rudder.

This organ might be considered either as the external ovary, or as a spermatic tube similar to that which Siebold has described in *Diaptomus Castor**. In support of the latter hypothesis it may be adduced, that the organ in question differs from all other known external ovaries belonging to this family, in being attached to the back instead of the under surface of the body, and in being long and cylindrical instead of pear-shaped. In shape it agrees exactly with Siebold's drawing of the spermatic tube in *Diaptomus*, and at its base is a quantity of hard, reddish, irregular matter, which forms a small lump on the left side, and is firmly attached to the body of the animal. This strongly reminds one of the glutinous substance by means of which the spermatic tube is attached to *Diaptomus*, and which is driven out by the expulsive matter. If we consider it as a true external ovary, how can we account for this deposit?

It is also worthy of notice, that in Templeton's paper on *Anomalocera* there is figured (fig. 22) and described a "biarticulate spatulate appendage, which is confined to the left side of the female, and attached to the first joint beneath; it is probably a collapsed ovary."

Might not this be a spermatic tube? In Gaimard's 'Voyage en Scandinavie,' a female *Calanus hyperboreus* is represented with an appendage, evidently a spermatophore, attached below to the penultimate thoracic joint. It is true that this organ is ringed, and differs very considerably both from Siebold's figures of the spermatic tube in *Diaptomus*,—from the above-mentioned doubtful appendage of *Anomalocera*,—and from that of the present species; still it establishes the fact, that this mode of fecundation is very generally pursued in this curious family. In all these cases, however, it is attached below.

On the other hand, we may observe, that its position, though curious, is not entirely anomalous, for *Notodelphys Ascidicola*,

* Annales des Sciences Naturelles, 2nd series, tom. xiv.; and Baird's British Entomostraca, p. 223.

Allman, has its external ovary on the back, and in the *Daphnidæ* the receptacle for the eggs, which corresponds in function, is always situated dorsally, whereas the spermatic tube is attached on the under surface close to the vulva, as would appear evident; for if it was not so, how could the spermatozoa reach the eggs? It may perhaps be said, that the glutinous matter forms a tube down the side of the body, and in that way opens close to the vulva; but this does not appear to me probable, for in that case the animal would lose its equilibrium; and besides, I could see no excrescence of that sort; and if it were present, I could hardly have overlooked it. Unless then we suppose that the vulva is situated on the back, its position seems rather in favour of its being an external ovary. From the function of the spermatic tube, we should expect to find it only when the eggs were well developed, but I could not see them in any one of the three females provided with this organ which I have examined; it is true, however, that in the figure of the female *C. hyperboreus* above referred to, which is provided with a spermatophore, no external ovary is represented. Its size also seems almost too large to admit of its having been developed in the generative organs of the male.

The shape of the organ in question, though certainly very different from that of the external ovary in the rest of the family, is however the same as that which prevails in all the *Caligidæ*. In *Caligus* the ovaries are attached to the body by their internal angles, and in *Iva* by the centre; but if we consider that of the latter genus as homologous with the two of the former coalesced, this difference will be removed.

The chief obstacle to this view is the absence of eggs; but Dr. Baird, in his volume on the 'British Entomostraca,' p. 49, describing the process of laying in *Chirocephalus*, says, "When the proper time arrives, the mother deposits these eggs loose in the water, the ovary opening at the point and the eggs being thrown out by a sudden jerk;" and it seems to me possible, that, either in the violent struggles which follow when any Entomostracan is placed in spirits of wine, the eggs may have been expelled, or that they may have been so in the course of nature shortly before they were captured.

I have endeavoured impartially to state both sides of the question, but the paucity of specimens unfortunately makes it impossible to prove either, so that it must be left to some future observer to decide the question*.

* Mr. Darwin and Dr. Baird, who have both examined my specimens very carefully, agree with what I have said above. If it had not been for their assistance my task would have been much more difficult.